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ABSTRACT

Graduate school deans were surveyed to identify characteristics indicating Ph.D. program quality, as well as acceptable ways to measure such characteristics. Doctoral programs in many different fields of study were considered, but three purposes of a Ph.D. program were emphasized: the training of scholarly researchers, college teachers, and professional practitioners. Two separate questionnaires were sent to 63 deans; 60 responded to at least one questionnaire. The first involved program characteristics that indicate quality for each of the three training goals. The second dealt with the availability and adequacy of measures of these program characteristics. Data were also collected on the background characteristics of the respondents. The results indicated that the most important criteria included: (1) faculty training, research activity/productivity, and teaching effectiveness (2) student ability before and after the program, and graduates' accomplishments; (3) financial support for the program, library, laboratory, and facilities; and (4) program purposes, courses offered, and admission policies. Ways to measure these criteria were suggested; data were provided about their adequacy and availability, and percent of administrators preferring each measure. The respondents also ranked the importance of the major tasks performed in their own institutions. (GDC)

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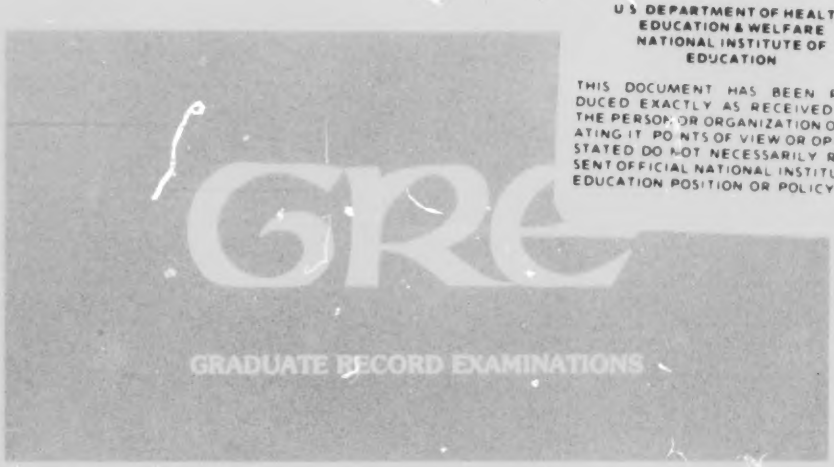

THE ASSESSMENT OF QUALITY IN PH.D. PROGRAMS: A PRELIMINARY REPORT ON JUDGMENTS BY GRADUATE DEANS

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(September 1973)

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EDUCATIONAL TESTING SERVICE, PRINCETON, NJ

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THE ASSESSMENT OF QUALITY IN PH.D. PROGRAMS:

A PRELIMINARY REPORT ON JUDGMENTS BY GRADUATE DEANS

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THE ASSESSMENT OF QUALITY IN PH.D. PROGRAMS: A REPORT

ON JUDGMENTS BY GRADUATE DEANS

Abstract

Sixty-three graduate deans were selected to represent Ph.D.-granting universities varied by geographic region, prestige, control, and size. Ratings on the importance of Ph.D. program characteristics to judgments about quality were obtained from more than 80 percent of the panel; in response to a second questionnaire, panel members also rated the adequacy or acceptability of several alternative ways to measure each important characteristic. Procedures and results of the two questionnaires are discussed, a summary list of endorsed program characteristics and indexes is presented, and further research is suggested.

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FOREWARD

High quality is the goal of every Ph.D. program. Yet little is known about how to assess quality, or even what to assess. In an effort to narrow this knowledge gap, the Graduate Record Examinations Board together with the Council of Graduate Schools asked Educational Testing Service to identify program characteristics which could be used to assess quality in doctoral education and to suggest some appropriate indicators of these characteristics. This report presents preliminary results of a survey to selected graduate school deans which was undertaken in order to fulfill this request. Funds for the study were provided by the Graduate Record Examinations Board and Educational Testing Service.

This preliminary report was prepared for the September 1973 meeting of the Graduate Record Examinations Board Research Committee and for an October 1973 meeting of the project steering committee. In order to share the results more broadly with a minimum of delay, this preliminary version is also being distributed to participants in the study, members of the Council of Graduate Schools, and other interested parties. Some further analysis of the second survey results is anticipated and will be incorporated into subsequent articles or reports. In particular, 14 late questionnaires will be added to the tabulations in Appendix C so that these results reflect the opinions of 90 percent of the sampled graduate school deans, rather than the 68 percent representation reflected in this preliminary version of Appendix C. Other suggestions for revision are solicited from interested readers.

Special appreciation is extended to the participants in this survey. With only one telephone reminder about three weeks after each questionnaire was mailed, 60 out of 63 panel members responded to at least one of the two requests for judgments. Responses on the questionnaires were consistently thoughtful and complete. Such expression of interest and cooperation is extraordinary for a mail survey, particularly given the tight time requirements and the length and complexity of the questionnaires in this study. Whatever value may be found in the results is due to the high level of professional commitment and the good natures of these graduate deans, in addition to their expert judgment about quality in doctoral education.

Princeton, N. J.
November, 1973

THE ASSESSMENT OF QUALITY IN PH.D. PROGRAMS: A REPORT ON JUDGMENTS BY GRADUATE DEANS

Mary Jo Clark

The purpose of this project was to identify characteristics related to Ph.D. program quality and some acceptable ways to measure each characteristic by collecting judgments from a sample of graduate school deans. Part of a larger proposal to study the assessment of quality by developing instruments and collecting data on programs in selected fields (Clark & Hartnett, 1973), this study was designed to provide four kinds of information:

1) the extent of agreement among graduate deans about Ph.D. program characteristics most important to judgments about quality;

2) variations in the importance of characteristics depending upon the major purpose of a Ph.D. program;

3) the judged adequacy or acceptability of possible measures for each characteristic; and

4) the current availability of various kinds of information.

It was thought that these data would be of immediate interest to members of the graduate school community, given recent pressures for program evaluation at the graduate level, and also would help to specify areas for primary attention in the larger proposal for empirical research.

The direction and scope of the study were determined in large part by a steering committee of graduate deans appointed by the Graduate Record Examinations Board and The Council of Graduate Schools.[1] The project was funded by the GRE Board.

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[1]Members of the steering committee appointed by GREB were William Burke, Arizona State University; Bernard Harleston, Tufts University; Robert MacFarland, University of Missouri at Rolla; and Donald Taylor, Yale University. Members appointed by CGS included Mary Evelyn Huey, Texas Woman's University; Philip Kubzansky, Boston University; Charles Lester, Emory University; and Joseph McCarthy, University of Washington. Michael Pelczar, chairman of the GREB, and J. Boyd Page, President of CGS, were ex officio members of the committee.

Parameters or guidelines for the study, agreed upon by the steering committee at the outset, included the following:

1. The survey would concern Ph.D. programs only.

2. Three alternative purposes of Ph.D. programs would be considered: the training of scholarly researchers, college teachers, and professional practitioners.

3. Dimensions of quality that are common across many fields of study would be emphasized.

4. An array of characteristics and measures would be sought, rather than a single rating or score.

5. The survey would be limited to a small but varied sample of graduate school deans.

Procedure

The study was designed as a two-stage mail survey to about 60 graduate school deans. The first questionnaire sought opinions about the importance of various program characteristics to the achievement of high quality doctoral education for each of three program goals. The second questionnaire suggested possible measures for the more important program characteristics and asked for judgments about the adequacy and availability of each measure. Frequency tabulations were compiled on the importance of characteristics and on the adequacy of measures to assess the degree of consensus among respondents on each variable. In addition, mean ratings were computed so that program characteristics could be arranged in the order of their rated importance and measures rated "good" or better could be identified. Sample selection, questionnaire development, data collection, and data analysis are described in greater detail in the following sections.

Sample

Sixty universities offering the Ph.D. degree were selected for inclusion in the study, using the following criteria:

1. all universities represented on the GRE Board

2. all universities represented on the CGS executive committee

3. other universities to provide an over-all representative sample of Ph.D.-granting universities by geographic region, prestige rating, control, and size.

The sample was drawn from the master list of universities included in the 1972 GRE/CGS Graduate Programs and Admissions Manual, which represents over 85 percent of the graduate enrollment in the United States and an even higher percent of the doctoral degrees awarded annually. These universities were sorted by geographic region, universities meeting the first or second criterion were identified, and additional universities were selected from each region to total about one out of every four Ph.D.-granting universities of varying prestige, control, and size. The number of selected institutions that fall in each cell of the sampling matrix are reported in Table 1. Slightly over 40 percent of the universities in the sample are included in a list of "top 50" institutions (Millman & Toombs, 1972). About 60 percent of the universities are public and 55 percent have large (more than 2000 students) graduate enrollments. About 40 percent of the universities are private and 45 percent have small (less than 2000 students) graduate enrollments. It was assumed that the graduate deans at these varied kinds of institutions would reflect, at least in part, the different philosophies and opinions about quality that might be associated with each of them. Universities included in the sample are listed in Appendix E.

The final mailing list consisted of 15 members of the GRE Board, 9 members of the CGS executive committee (not counting duplicates with the GREB), and 39 graduate deans at other institutions in the sample. Because of some overlap in categories, questionnaires were sent to two persons at three universities for a total of 63 panel members.

Though the sample was drawn to include as much diversity as possible in a panel of 60 graduate deans, the results may not accurately reflect the opinions of all graduate deans in every type of program. Also, the advantages of a relatively small group for an intensive survey inevitably are balanced by the disadvantages of small numbers for interpretation and generalization of the results. These limitations of the study should be kept in mind throughout the remainder of this report.

Questionnaires

The first questionnaire, concerning the importance of program characteristics to judgments about quality, grouped characteristics under four major headings: Faculty Members, Students, Resources, and Program Operation. Ten to 20 specific characteristics were listed under each topic, such as "academic training" and "teaching experience" under Faculty and "general academic ability at entrance" under Students. Panel members were asked to indicate the importance of information about each characteristic when judging the educational quality of a Ph.D. program to train a) researchers, b) teachers, and

Table 1

Characteristics of Universities in the Sample

Geographic region[1]	Percent of population in sample[2]	Prestige rating		Control		Size[4]	
		top 50[3]	other	public	private	Under 2000	Over 2000
Northeast	40	3	5	2	6	5	3
East	26	7	5	5	7	6	6
Midwest	24	6	7	10	3	5	8
South	25	6	9	10	5	7	8
West	29	4	8	9	3	4	8
Total Number	60	26	34	36	24	27	33
Percent	27	43	57	60	40	45	55

[1]For composition of regions see Roose & Anderson, 1970, p. 5.

[2]Population is Ph.D. universities included in the GREB/CGS Graduate Programs and Admissions Manual, 1972. Thirty-seven states are represented in the sample.

[3]Based on composite scores prepared by J. W. Johnston from the Roose and Andersen ACE ratings and reported in Millman & Toombs, 1972, p. 15.

[4]Total graduate school enrollment 1971-72 as reported by the universities and listed in the Manual.

c) practitioners. Ratings were made on a four point scale from "essential" to "not important". Respondents were invited to comment on individual items and to add items if they felt important characteristics had been omitted.

Program characteristics listed under each heading on the first questionnaire were identified through discussion with the project steering committee, review of graduate education and evaluation literature, and discussion with others knowledgeable about graduate education. Helpful materials included Berelson, 1960; Blackburn & Lingenfelter, 1972; Brown, 1970; Cartter, 1966; Dressel, et al, 1970; Elton & Rodgers, 1971; Elton & Rose, 1972; Hagstrom, 1971; Heiss, 1970; National Science Board, 1969; Powel & Lamson, 1972; Stanford, 1972; and Tyler, 1972. Preliminary questionnaires from the "Outcomes Identification" project of the National Center for Higher Eduation Management Systems, Western Interstate Commission for Higher Education, also were helpful.

The first questionnaire also asked for certain background information about the respondent, including his or her academic discipline, highest degree, university awarding highest degree, and years of experience on a graduate faculty. In addition, the deans were asked to rank the major tasks of their own institutions' Ph.D. programs, in the order of their importance in the physical sciences, biological sciences, social sciences, and humanities. The three major tasks to be ranked were the training of researching scholars, college teachers, and professional practitioners.

The second questionnaire built on the results of the first one, arranging characteristics under each of the four headings in the order of their rated importance to quality and eliminating some of the lower-rated characteristics. As many as 13 possible measures were then listed for each characteristic. Many of the measures were suggested by the literature reviewed to identify important program characteristics for the first questionnaire; additional helpful materials included Fenstemacher, 1972; Fleming, 1973; Gregg, 1972; Lamson & Swaine, 1973; McMichael, 1973; Roaden, 1972; Roaden & Larimore, in press; Webb, 1972; and guidelines for the evaluation of graduate education in the State University of New York, University of California at Berkeley, University of Washington, and University of Michigan. Some of these materials were supplied or suggested by panel members in response to the first questionnaire.

The full list of possible measures for each characteristic may be found in Appendix C, which presents the tabulated results of the second questionnaire.

The second questionnaire asked panel members to respond in three ways to each possible measure: 1) rate its adequacy or appropriateness as an indicator of the quality of the listed program characteristic, using a four point scale from "very good" to "inadequate"; 2) indicate one measure for each characteristic preferred by the respondent; and 3) indicate whether the information is currently available, not available, or whether availability varies from program to program. Again, respondents were invited to comment on each item and to add measures to each list.

Data Collection

Both questionnaires were accompanied by a personally addressed and typed cover letter signed by the chairman of the Graduate Record Examinations Board and the president of the Council of Graduate Schools. The first questionnaire was mailed on May 3, 1973. Fifty completed responses had been received by the cut-off date of June 4. Four more were received too late to be counted, for a total response rate of 86 percent and usable response rate of 80 percent.

The characteristics of respondents to the first questionnaire are detailed in Table 2. Most of the graduate deans in the survey panel hold Ph.D. degrees from prestige universities and have served for 20 years or more as a member of a graduate school faculty. Almost three out of four of them specialized in the social sciences, physical sciences, or engineering. The geographic regions, prestige, control, and size of their employing universities are very much like characteristics of the total sample (see Table 1). Thus, though their own backgrounds tend to be in prestige institutions and in the social or natural sciences, they now represent more diverse institutions and types of graduate programs.

The second questionnaire was mailed on July 3, 1973, with a cut-off date of July 31 for tabulation. Forty-three completed questionnaires had been received by this time; nine more questionnaires came in after this date, for a total response rate of 83 percent.

The tight cut-off date for the second questionnaire, resulting in tabulation of 43 responses (68 percent of the panel), was necessitated by deadlines to produce this report for the September meeting of the GRE Board. Visual inspection of the nine questionnaires received after July 31 does not indicate any glaring inconsistency with the 43 making up the data pool, but this could be determined for sure only by re-running the data with all 52 responses. Six of the 9 uncounted questionnaires were from deans at large "top 50" public institutions and these universities were somewhat underrepresented in the count.

Table 2

Characteristics of Panel Members Who Returned the First Questionnaire (N=54)

Characteristics		N	%
Personal Characteristics			
Title:	Dean of the Graduate School	39	72
	Vice-president, provost, or chancellor	8	15
	Professor	3	06
	Assistant or associate dean	4	07
Highest degree:	Ph.D.	49	91
	Other doctorate	5	09
Area of academic specialization:			
	Humanities	6	11
	Social sciences	20	37
	Biological sciences	8	15
	Physical sciences & engineering	20	37
University awarding highest degree:			
	"Top 50"	46	85
	Other	8	15
Years of experience in graduate education:			
	Ten years or less	4	07
	11 - 15 years	10	19
	16 - 20 years	12	22
	More than 20 years	27	50
	No answer	1	02
Institutional Characteristics			
Geographic region:			
	Northeast	7	13
	East	10	19
	Midwest	11	20
	South	14	26
	West	12	22
Prestige:			
	"Top 50"	24	44
	Other	30	56
Control:			
	Public	34	63
	Private	20	37
Size:			
	Fewer than 2,000 graduate students	26	48
	More than 2,000 graduate students	28	52

Data Tabulation

The first questionnaire was tabulated by hand for frequency distributions and mean ratings on the importance of information about various program characteristics in programs designed for three different purposes. Though this procedure served its purpose of providing summary tabulations for use in construction of the second questionnaire immediately after the cut-off date, wear and tear on personnel and prospects for error dictated machine tabulation for the second questionnaire.[2] Face-sheet information concerning the background and training of respondents, characteristics of their universities, and rank order ratings of the major tasks of Ph.D. programs at their universities were keypunched and hand sorted by various subgroups of respondents.

Results

Detailed tabulations of the first questionnaire, concerning the importance of program characteristics, are presented in Appendix B; tabulated ratings of all suggested measures and their availability will be found in Appendix C. Appendix D summarizes the rank orders assigned by respondents to the major tasks of their institutions' Ph.D. programs in four major curricular areas. Appendix A summarizes the materials in Appendixes B and C by listing only the most important program characteristics and the most acceptable measures in the order of their endorsement by graduate deans. Though probably still somewhat too long and detailed, this summary list of program characteristics and measures provides an important first step in efforts to establish a systematic procedure for the assessment of quality in Ph.D. programs of study.

The remainder of this section briefly discusses the results of each questionnaire and the summary listing of program characteristics and measures.

First Questionnaire: Program Characteristics Important to Quality

From detailed results of the first questionnaire (Appendix B), it is apparent that graduate deans agreed about the importance of some kinds of program information for the assessment of quality

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[2] Robert A. Marozsan prepared the computer program for tabulation of the second questionnaire.

and disagreed about the importance of other characteristics. In addition, about two-thirds of them made distinctions about the level of importance of certain characteristics depending upon whether the program was designed to train research scholars, college teachers, or professional practitioners. The greatest number of differences occurred in relation to the characteristics of faculty members (Table B.1). For instance, the research conducted by faculty members and the national honors they receive were considered very important to quality in programs designed to train research scholars. But teaching effectiveness, teaching experience, and concern for undergraduate learning were most important when evaluating programs to train college teachers.

The importance of knowing about some resources (Table B.3) also varied by program purpose; laboratory and computer facilities and external financial support are examples. But different program purposes did not appear to influence very greatly the importance ratings assigned to student characteristics (Table B.2) or the desirability of information about various operational aspects of programs (Table B.4). These results suggest that it may be possible to vary information about a few selected characteristics according to the primary purpose of a program under study, rather than setting up different assessment procedures for each kind of program.

In general, characteristics with a mean rating below 2.0 (1 = "Essential;" 2 = "Important") for at least one type of program (last column in Appendix B) were considered to have been endorsed by the panel and were included on the second questionnaire. In addition, a few characteristics were re-structured based on comments of respondents and apparent overlap. These criteria eliminated 5 of the 15 characteristics originally listed under "Faculty Members," 8 of the 17 characteristics listed under "Students," two of the 10 characteristics listed under "Resources," and 6 of the 21 characteristics listed under "Program Operation." In general, the characteristics omitted from the second questionnaire are the ones toward the end of each table in Appendix B.

Though one purpose of the first questionnaire was to eliminate some characteristics, the detailed results in Appendix B warrant further attention along two lines: the differences in rated importance depending upon the purposes of Ph.D. programs, as noted above, and the distribution of importance ratings assigned to each characteristic by panel members. Though the mean ratings provide a convenient index for the identification of the most important characteristics, the frequency tabulations of ratings give a better indication of the degree of consensus among graduate deans about the importance of each characteristic. For example, Table B.1 reports that more than

80 percent of the respondents agreed that it is essential to know about the research activity and productivity of faculty members who are training research scholars. But they did not agree to the same extent about the importance of similar information concerning faculty members who are training professional practitioners. Also in this table, there is disagreement over the importance of knowing about faculty concern for student development and welfare, teaching effectiveness, involvement in program affairs, or group morale when making judgments concerning the quality of programs to train research scholars. Similar examples of apparent consensus or difference of opinion can be found in the tables on Students, Resources, and Program Operation. These different points of view among experts in graduate education have implications for the development of any systematic approach to the assessment of quality in Ph.D. programs of study.

Second Questionnaire: Measuring Important Characteristics

Frequency tabulations and mean ratings on the second questionnaire are reported in detail in Appendix C. As with the importance ratings of characteristics, the mean ratings of measurement adequacy are useful as an index to identify those measures generally considered "very good" or "good" by the panel of graduate school deans, but the frequency distributions of ratings give a better indication about the degree of consensus among the deans. For instance, the first characteristic under Faculty (Table C.1) includes "appropriateness of specialty areas of training to purposes of the program, as evaluated by a visiting team of experts," which received a mean rating of 3.0 or a "good"[3] indicator of the academic training of faculty. But this mean rating masks the fact that an equal number of deans rated the measure "very good" and "poor or inadequate." It was preferred by a few, but two other measures received much higher preference endorsement. Also, information about the two more preferred measures is already available on more campuses. Therefore, though this measure received a "good" average rating, two others probably are potentially more useful. On the other hand, it was rated higher than three other possible measures on the list, though each of these measures was considered "very good" by a few graduate deans and two of the three were preferred measures by a few respondents.

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[3]The rating scale on the first questionnaire (Appendix B) was 1=Essential to 4=Not important. The rating scale on the second questionnaire (Appendix C) was 1=inadequate to 4=very good. In the summary of the data (Appendix A) the rating scale on the first questionnaire has been reversed so that higher mean ratings always mean "more important" or "more adequate."

A similar comparative analysis could be made among the measures suggested for each program characteristic listed in Appendix C, and probably should be done by a group of experts in graduate education who could interpret more fully the meaning of the results for the measurement of each characteristic. Such an extensive analysis is beyond the scope of this brief report, though it is recommended as a fruitful next step by an appropriate group. There are a few more general comments about the ratings of the measures, however, that do seem appropriate at this time.

First, there is generally good agreement between high mean ratings on measurement adequacy and preference for a measure. Preferences sometimes scatter over several items, particularly if a number of possible measures were suggested for a given characteristic, but generally 70 to 80 percent of the first preferences were received by measures that also received a mean rating of 3.0 ("good") or above. Occasionally a measure was preferred by a number of deans even though it was not considered a particularly good index, such as a measure for characteristic 10 in Table C.1 (concern for undergraduate learning) that was preferred by 15 deans but had a mean rating of 2.86, but this is unusual. In general, the concurrence of mean ratings and preference choices is an encouraging indication that these measures are acceptable to graduate deans and therefore likely to be useful in the assessment of program quality.

Second, for most program characteristics there are one or two or three measures that were definitely rated higher and preferred more often by deans, while there are some measures that were definitely considered poor or inadequate by an appreciable number. Consensus was great enough so that, on most characteristics, a clear line can be drawn between the measures that are endorsed by the panel of deans and those that are controversial or inadequate. Therefore, though the list of items on the second questionnaire was very long and burdensome for respondents, their ratings clearly recommend the development of some assessment procedures rather than others. Endorsed characteristics and measures could provide the framework for a model to assess quality in Ph.D. programs that would be appropriate for use at a variety of universities. These results also may be helpful to those who are attempting to choose among various possible ways to assess Ph.D. programs in specific settings.

Third, while some of the standard input measures are endorsed as indexes for several of the program characteristics, self-report measures from program participants (program directors, faculty members, and students) and judgments by both a visiting panel of experts and by program participants are rated highly as indexes for a number of characteristics. The endorsement of judgments by a visiting panel of experts is consistent with the current practice at a number of universities to use outside teams as part of the evaluation process

(McMichael, 1973) and supports a recent recommendation to the Board of Regents concerning the evaluation of graduate education in New York (Fleming, 1973). The support for ratings, judgments, and reports from faculty members and students was not so predictable, but it has even more important implications for the development of procedures for program assessment. These ratings suggest that some standard methods to collect the judgments and opinions of faculty members and students on selected aspects of their graduate programs would be welcomed and endorsed by many graduate school deans.

Fourth, these data indicate that much of the more acceptable or adequate and preferred information needed to make judgments about the quality of Ph.D. programs is not currently available on university campuses. The "availability" responses should not be interpreted too literally, since comments on the second questionnaire suggest that somewhat different interpretations were given to the question. But it is probably accurate to conclude that information is generally available for only about one out of five of the measures that received mean ratings of 3.0 or above. Standard procedures to collect some of the currently unavailable information should be welcomed by the graduate schools as well as by other agencies interested in program evaluation.

Summary List of Measures for the Assessment of Quality in Ph.D. Programs

Appendix A summarizes the results of two questionnaires to a representative panel of graduate school deans by listing the characteristics of Ph.D. programs in the order of their rated importance for judgments about quality, and listing the most acceptable or adequate measures for each characteristic in the order of their rated adequacy. Characteristics and measures are grouped under the same four headings used in Appendixes B and C: Faculty Members, Students, Resources, and Program Operation. Items under each heading are from the more detailed reports (Appendixes B and C) but their orders have been changed in the summary list to reflect their relative endorsement. Characteristics listed under each heading in the summary range from "essential" (ratings of 3.5 or above) to "important" (ratings 3.4 to 2.6). Most measures have a mean adequacy rating of 3.0 or above ("good" to "very good"), though occasionally a measure with a rating slightly below 3.0 that is preferred by a number of panel members is included in the list. Notes preceding the summary list define the terms and symbols used in the tables.

This listing of program characteristics and measures is not proposed as a definitive view of quality in Ph.D. programs of study, but rather as a first winnowing of the multitude of characteristics and measures that might be considered in the assessment of such a

complex and varied set of educational efforts. The list as it stands now would profit from further review by experts in the field of graduate education, and probably could be shortened and simplified somewhat. However, even in its present form it represents a better picture of Ph.D. program assessment procedures that would be acceptable to a cross-section of graduate school deans than has been available so far. As such, it should be useful to the graduate education community, as well as to others who are interested in furthering the systematic development of procedures to assess quality in graduate education.

Conclusions and Recommendations

This report presents the opinions of a sample of graduate school deans concerning the importance of various program characteristics to judgments about quality and the adequacy or acceptability of several ways to measure each characteristic. In addition, program characteristics are evaluated in relation to the primary goals of preparing research scholars, college teachers, or professional practitioners, and some estimate is made about the present availability of information suggested by the measures. All ratings concern Ph.D. programs of study, and emphasize dimensions of quality that are common to many fields of study.

The most important characteristics and the most acceptable measures are summarized as a first step toward the development of a model to assess quality in Ph.D. programs of study. This listing can provide guidelines for efforts at individual universities to establish appropriate evaluation procedures, and also provides a framework for more detailed work on the development of systematic procedures for the assessment of quality in doctoral education. Several next steps are possible; the following three recommendations are suggested as ways to begin to refine and build on these data.

First, more research should be done on differing points of view about the importance of program characteristics and the adequacy of measures. There may be identifiable subgroups of opinion within this sample of graduate school deans; more detailed analysis of their responses would be needed to determine whether their opinions are moderated by their own academic training and fields of specialization, or type of employing university, or other conditions. In addition, other publics, such as faculty members in selected Ph.D. programs, students, accrediting groups, or legislators, might have similar or different opinions about the relationship between various program

characteristics or measures and judgments about quality. Consensus across groups as well as among graduate school deans could be determined through "schools of thought" analytic procedures suggested in the first stage of the earlier proposal for research on quality in doctoral programs (Clark & Hartnett, 1972).

Second, discussion of the results by a group of experts in graduate education would be useful. What difficulties may be encountered in attempting to collect the preferred but unavailable kinds of information? How much weight should be given to the purposes of a program when deciding upon characteristics to be measured, given the importance ratings for different program purposes? What interpretation should be given to the differences in points of view about the importance of characteristics and the acceptability of measures within this sample of experts in graduate education? How can a research and development project minimize (or utilize) these differences when developing some systematic procedures for program assessment? A special group might be gathered to discuss the results, or such discussions might be initiated at scheduled professional or association meetings.

Third, the summary of important characteristics and acceptable measures could be used as a framework for a model to assess quality in Ph.D. programs which could be tested empirically (second stage of the Clark and Hartnett proposal). Research along these lines would develop procedures to collect preferred information and then use these procedures to obtain data from selected doctoral programs in order to examine their reliability and validity as well as evaluate the relationships among variables selected for study.

Appendix A

A Summary List of Measures for the Assessment of Quality in Ph.D. Programs

Notes

1. Importance ratings of program characteristics:

   4 = Essential to have information about this characteristic in order to judge quality
   3 = Important to have this information
   2 = Perhaps useful; not particularly important
   1 = Not important to judgments about quality

   (This scale reverses the one used in Appendix B to tabulate results of the first questionnaire, in order to obtain greater ease of interpretation.)

2. Mean importance ratings in this summary are the inverse of the grand mean of the ratings for each of the three program purposes reported in the last column of Appendix B. A specific assessment plan should consider these more specific ratings depending upon the primary purpose of the programs to be studied.

3. Adequacy ratings of measures:

   4 = Very good indicator of the quality of given characteristic
   3 = Good indicator
   2 = Poor but useable indicator
   1 = Inadequate indicator

4. The "percent preferred" column represents the percent of 43 respondents who selected this measure as their first-choice or preferred measure for a given characteristic.

5. The "percent available" column represents the percent of 43 respondents who indicated that the information could be supplied from records without new data collection. Responses generally ran 37 to 40 out of 43; therefore, 10 to 15 percent of the total often are non-respondents. The number of deans who say the availability of information varies from department to department, in addition to being generally available, can be determined from Appendix C.

Note especially that the characteristics in each section of this list are also listed in comparable sections of Appendixes B and C, and the measures in each section are also listed in comparable sections of Appendix C, but the order of arrangement is different to reflect the results of importance and adequacy ratings on the two questionnaires.

Table A.1

FACULTY Characteristics and Measures

Characteristic			Measures		
Mean importance			Mean Adequacy	Percent Preferred	Percent Available
3.57	A.	Academic training of faculty			
		1. Percent with Ph.D.'s or equivalent degrees	3.37	33%	100%
		2. Percent of Ph.D.'s from "top" programs in each field, as defined by a reputational survey	3.33	42	65
		3. Appropriateness of specialty areas of training to purposes of the program, as evaluated by a visiting team of experts	3.00	09	12
3.41	B.	Research (or other scholarly or creative) activity			
		1. Average number research proposals funded in the last three years per FTE faculty	3.40	30	09
		2. Average number invited presentations of research results in the past year (visiting lectures, colloquia, workshops, professional meetings, etc.) per FTE faculty	3.33	16	37
		3. Percent of faculty actively involved in the publication of research results (journal editor, editorial board members, referee for submitted articles, etc.)	3.26	14	49
		4. Average number research projects in progress per FTE faculty	3.02	26	21
3.20	C.	Research (or other scholarly or creative) productivity			
		1. Weighted average number publications (giving progressively more weight to refereed journals, single authorship of articles, senior authorship of books, etc.) in the past three years (sub. no. patents or artistic performances or products where appropriate)	3.74	77	28
		2. Average number journal articles published in the last three years per FTE faculty	3.51	09	67

Characteristic		Measures		
Mean Importance		Mean Adequacy	Percent Preferred	Percent Available
3.17	D. Teaching effectiveness			
	1. Avg. ratings by students on a course and teacher evaluation form	3.10	37%	21%
	2. Presence of innovative teaching procedures and/or outstanding instructional materials, as judged by visiting panel of experts	3.10	16	07
3.11	E. Concern for student development and welfare			
	1. Average student (or former student) rating on a scale measuring faculty concern for student development and welfare, accessibility, advising skill, etc.	3.23	58	07
2.94	F. Involvement in program affairs			
	1. Faculty degree of agreement with and commitment to the purposes and goals of the program	3.26	47	05
	2. Faculty satisfaction with influence on important decisions concerning the program	3.21	37	07
2.93	G. Teaching experience			
	1. Avg. no. of years of teaching experience at the college or university level in appropriate area of specialty	3.05	72	70
2.88	H. Honors and awards; national professional recognition			
	1. Average number professional honors and awards per FTE faculty over the past three years	3.33	40	35
	2. Average reputational rating of the faculty among colleagues (cf, ACE ratings)	3.14	30	37

Characteristic			Measures		
Mean importance			Mean Adequacy	Percent Preferred	Percent Available
2.78	I.	Group morale or esprit			
		1. Avg. faculty-reported satisfaction with program leadership, enthusiasm for the program, loyalty, involvement, etc.	3.45	51%	09%
		2. Relative vitality vs. malaise among the faculty, as rated by a visiting panel or experts	3.23	14	09
2.55	J.	Concern for undergraduate learning			
		1. Quality of a program to train and supervise teaching fellows, as rated by:			
		a) students	3.12	14	07
		b) faculty members	2.95	02	02
		c) visiting panel of experts	2.93	07	05
		2. Faculty-reported sensitivity to the interests, needs, and aspirations of undergraduates	2.86	35	02
		3. Percent of graduate faculty who teach at least one undergraduate course per year	2.86	14	67

Table A.2

STUDENT Characteristics and Measures

Characteristic		Measures		
Mean importance		Mean Adequacy	Percent Preferred	Percent Available
3.61	A. General academic ability of students entering the program			
	1. Avg. score on graduate aptitude test (GRE, MAT, etc.)	3.42	21%	67%
	2. Avg. undergraduate GPA	3.37	35	79
	3. Avg. score on appropriate GRE Advanced Test (or other ach. test)	3.09	07	60
	4. Percent of enrolled students with national fellowships (NSF, Woodrow Wilson, etc.)	3.07	09	65
3.61	B. Achievements, knowledge, and/or skills of students at time of completion of degree			
	1. Excellence or uniqueness of dissertations and theses in the last three years, as evaluated by external judges	3.47	26	05
	2. Percent of graduates in the last three years who obtained employment directly related to their field of specialization	3.33	26	47
	3. Percent of graduates in the last three years who published something prior to the degree	3.24	23	28
3.38	C. Professional accomplishments of graduates			
	1. Percent of graduates occupying positions of leadership and influence in the field, as judged by outside experts	3.37	23	02
	2. Avg. no. publications by those who graduated in the last five years	3.30	21	09
	3. Avg. rating by employers on knowledge, skill, and performance of recent graduates	3.14	12	0
	4. Percent of graduates currently employed by doctorate-awarding universities	3.09	12	32

STUDENTS (cont.)

Characteristic Mean importance			Measures Mean Adequacy	Percent Preferred	Percent Available
3.37	D.	Gains in student knowledge and/or skills during their degree program			
		1. Avg. evaluation by faculty advisers and by assistantship/internship supervisors of the "growth" observed in students over a two year period	3.12	40%	19%
3.15	E.	Career interests of students			
		1. Congruence of student career interests with program purposes and emphases, as judged by enrolled students	3.10	44	07
		2. Self-reported career plans of degree recipients	2.93	14	16
2.91	F.	Student perceptions of program quality			
		1. Avg. alumni (1-5 years) rating of experiences in the program	3.58	72	02
		2. Avg. student rating of the value of specified academic experiences in the program	2.98	12	07
2.89	G.	Satisfaction with various aspects of the degree program			
		1. Percent of students who would recommend the program to others with similar interests and abilities	3.40	51	05
		2. Avg. student-rated satisfaction with specified academic and non-academic aspects of the program	3.02	26	09

Characteristic		Measures		
Mean importance		Mean Adequacy	Percent Preferred	Percent Available
2.81	H. Group morale or esprit			
	1. Student sense of community, feeling of shared interests and involvement in worthwhile activities, as rated by students	3.30	23%	09%
	2. Avg. student satisfaction with rate of academic progress	2.88	12	07
	3. Avg. student-reported score on a scale measuring satisfaction with program	2.86	26	07

Table A.3

RESOURCES and Measures

Characteristic: Mean importance		Measures: Mean Adequacy	Percent Preferred	Percent Available
3.60	A. University financial support for the program			
	1. Judgments about the adequacy of university support relative to program purposes by a visiting team of experts	3.10	30%	12%
	2. Education and general expense budget per FTE student	3.00	14	70
	3. Ratio of program budget allocation to total university allocation for Ph.D. study	2.83	23	50
3.60	B. Library			
	1. Adequacy of relevant holdings as judged by:			
	a) visiting team of experts	3.45	44	21
	b) faculty members	3.43	26	28
	c) program chairman	3.07	0	23
3.47	C. Laboratory equipment and facilities (including facilities for the creative arts)			
	1. Presence of laboratory/creative equipment considered essential or important by experts in the field	3.56	42	26
	2. Adequacy of laboratory equipment and facilities as rated by:			
	a) visiting team of experts	3.53	19	16
	b) faculty members	3.40	28	23

RESOURCES (cont.)

Characteristic			Measures		
Mean importance			Mean Adequacy	Percent Preferred	Percent Available
3.18	D.	External financial support for the program			
		1. Outside funds as a percent of total program budget	3.42	35%	65%
		2. Avg. dollar income per FTE faculty from outside sources over the past three years	3.28	44	60
		3. Dollar amount of federal research project grants and contracts over the past three years	3.16	12	77
3.13	E.	Purposes and strengths of parent institution			
		1. Reputation of university as rated by knowledgeable educators	3.49	33	21
		2. Congruence of program and university purposes as judged by visiting panel of experts	3.19	14	16
		3. Level of support for the program from central university administrators, as judged by visiting panel of experts	3.07	12	12
3.11	F.	Financial support for students			
		1. Avg. dollars for all forms of financial assistance per FTE student	3.45	9	67
		2. Percent of students receiving any form of financial assistance	3.14	23	72
		3. Percent of students who hold fellowships or grants from external sources	2.98	12	77

RESOURCES (cont.)

Characteristic		Measures		
Mean importance		Mean Adequacy	Percent Preferred	Percent Available
3.07	G. Computer facilities			
	1. Adequacy of computer facilities for needs of the program as rated by:			
	a) visiting team of experts	3.44	33%	14%
	b) faculty members	3.37	21	30
	c) program chairman	3.14	05	33
	d) students	3.12	07	23
2.75	H. Classroom and office space for the program			
	1. Adequacy of classroom and office space as rated by:			
	a) visiting team of experts	3.05	32	14
	b) faculty members	2.91	19	19
	2. Avg. square feet of office and research space per FTE faculty	2.91	14	07

Table A.4

OPERATIONAL Characteristics and Measures

Characteristic		Measures		
Mean importance		Mean Adequacy	Percent Preferred	Percent Available
3.49	A. Purposes of the program			
	1. Clarity of program purposes and plans, as judged by:			
	a) visiting panel of experts	3.28	23%	07%
	b) recent graduates	3.26	14	02
	c) faculty members	3.19	21	16
	d) program chairman and/or graduate dean	3.14	09	23
	2. Relative emphasis on research, teaching, and service, as judged by visiting team of experts	3.05	02	14
3.45	B. Course and program offerings			
	1. Courses and other available experiences appropriate to purposes of the program and specialty training of the faculty, as judged by:			
	a) visiting panel of experts	3.56	44	09
	b) faculty members	3.26	23	19
	c) students	3.05	0	09
	2. Relative need for curriculum review and updating as judged by a visiting panel of experts	3.32	12	09

Characteristic		Measures		
Mean importance		Mean Adequacy	Percent Preferred	Percent Available
3.43	C. Admissions policies			
	1. Judgment of whether admissions standards should be higher or lower, as rated by:			
	a) visiting panel of experts	3.39	28%	12%
	b) faculty members	3.05	09	21
	2. Percent of qualified applicants who are admitted, as reported by the admission committee	3.09	21	67
	3. Relative selectivity of graduate and undergraduate students, as reported by the admissions committee	3.07	23	53
	4. Clarity of admissions procedures and standards, as judged by visiting panel of experts	3.00	0	12
(not rated)	D. Provision for the welfare of faculty members			
	1. Median salary by rank	3.26	21	86
	2. Extent of department and university support for the principle of academic freedom, as judged by outside experts	3.23	12	14
	3. Excellence of fringe benefits package, as judged by outside experts	3.10	02	16
	4. Faculty satisfaction with freedom to plan courses and conduct research without internal or external interference	3.07	19	09

(continued)

Characteristic Mean importance		Measures: Mean Adequacy	Percent Preferred	Percent Available
	5. Provision for assistance to new and young faculty, as judged by:			
	a) visting panel of experts	3.07	07%	07%
	b) faculty members	3.00	07	14
	6. Average teaching load	3.02	02	60
3.41	E. Provision for the evaluation of student progress			
	1. Clarity of requirements and standards for progression from entrance to candidacy with stated times for review and evaluation, as judged by:			
	a) visiting panel of experts	3.16	26	12
	b) program chairman	3.16	21	30
	c) students	3.14	21	16
3.37	F. Program leadership and decision-making			
	1. Quality of leadership provided by the program chairman as judged by:			
	a) visiting panel of experts	3.44	21	09
	b) graduate dean	3.40	19	37
	c) faculty members	3.37	33	16

Characteristic			Measures		
Mean importance			Mean Adequacy	Percent Preferred	Percent Available
3.31	G.	Job placement of graduates			
		1. Percent of degree recipients in last three years who were placed in positions directly relevant to their graduate education	3.56	40%	42%
		2. Satisfaction with program efforts to place graduates, as judged by students	3.26	14	12
		3. Percent of recent graduates who joined faculties at major doctorate-producing universities	3.07	07	51
		4. Profile of jobs taken by former students and graduates in the last three years	3.00	19	14
3.30	H.	Provision for the advisement of students			
		1. Quality of the advising system, as rated by:			
		a) recent graduates	3.42	40	02
		b) students	3.42	28	07
		c) visiting panel of experts	3.02	05	07
3.29	I.	Student-faculty interaction			
		1. Student-reported satisfaction with opportunity to work closely with at least one member of the faculty	3.42	46	05

Characteristic		Measures		
Mean importance		Mean Adequacy	Percent Preferred	Percent Available
3.17	J. Internships or other opportunities for relevant student experiences			
	1. Value of the internship or assistantship as rated by students who have completed the experience	3.31	46%	14%
	2. Percent of students who hold a research assistantship in the course of their attendance	3.14	09	70
	3. Percent of students who hold a teaching assistantship in the course of their attendance	3.12	09	70
	4. Percent of students who hold an apprenticeship or other preprofessional work assignment in the course of their attendance	3.07	07	46
3.16	K. Degree requirements			
	1. Flexibility of program requirements sufficient to meet individual student needs, as judged by:			
	a) visiting panel of experts	3.33	33	09
	b) students	3.15	16	07
	c) faculty members	3.02	05	16
	2. Clarity of specified competencies and qualities expected of graduates preparing to be researchers, teachers, or professional practitioners, as evaluated by:			
	a) visiting panel of experts	3.20	09	09
	b) faculty members	3.17	02	14
	c) students	3.07	0	09

Characteristic		Measures		
Mean importance		Mean Adequacy	Percent Preferred	Percent Available
3.07	L. Enrichment with visiting lecturers, colloquia, etc.			
	1. No. visiting lecturers, colloquia, etc., scheduled in the past six months	3.43	46%	49%
	2. Satisfaction with enrichment efforts of the program as rated by:			
	a) visiting panel of experts	3.13	19	05
	b) students	3.12	09	07
	c) faculty members	3.12	05	14
2.94	M. Relationships with cognate programs			
	1. Percent of program students enrolled for one of more courses in another department	3.14	26%	51%
	2. Relationships and interchanges with cognate programs as rated by:			
	a) program chairman and/or graduate dean	3.10	16	23
	b) faculty members	3.05	14	19
	c) students	3.05	07	14
	d) chairmen of cognate departments	3.05	07	21

Characteristic: Mean importance			Measures: Mean Adequacy	Percent Preferred	Percent Available
2.92	N.	Efficiency of degree production			
		1. Percent of those who enroll who earn the Ph.D.	3.45	42%	72%
		2. Estimated total avg. time required to complete the degree	3.14	09	58
		3. Ratio of doctorates awarded to no. of graduate faculty and to no. of enrolled students	3.02	23	65
2.86	O.	Plans for the future of the program			
		1. Appropriateness and detail of middle-range and long-range plans for the program, as evaluated by:			
		a) visiting panel of experts	3.37	46	12
		b) faculty members	3.07	12	19
		c) program chairman and/or graduate dean	3.02	19	30
2.83	P.	Size of the program			
		1. No. of enrolled students and first-year students in each of the past four years, by full-time and part-time	3.31	46	84
		2. Student/faculty ratio	3.07	28	84
		3. No. of graduate faculty members in each of the past four years, by full-time and part-time	3.00	05	77

Appendix B

The Importance of Program Characteristics for Judgments about Quality

Notes

1. Instructions to raters were as follows:

   For each of three types of doctoral programs--i.e., for those emphasizing the preparation of researchers, teachers, or practitioners--indicate how important it would be for you to have information about each listed program characteristic in order for you to make a judgment about a program's quality. Make your rating by writing a number in each column for each item, using the following rating code:

   1. Essential -- must have information about this in order to judge quality; this element of a program is critical to the achievement of excellence in doctoral education
   2. Important -- desirable to have this information if at all possible
   3. Perhaps useful; nice to know if easily available but not particularly important
   4. Not important to judgments about quality

2. Tables 1 through 4 report the ratings assigned respectively to characteristics of faculty members, students, program resources, and program operation. Within each set, the characteristics are listed in the order of their importance to quality judgments about programs to train research scholars.

3. Note that, in these tables, a higher mean rating is the lower number. For instance, these graduate deans say that it is more important to know about the research activity of a faculty member in a program to train researchers (mean rating of 1.08) than in programs to train teachers or practitioners (mean ratings of 1.71 and 1.98 respectively.)

4. Tabulated ratings of all program characteristics listed in the first questionnaire are included in these tables.

Table B.1

Important Information for Judgments about the Educational Quality of Ph.D. Programs:

CHARACTERISTICS OF FACULTY MEMBERS

Characteristic	In programs to train:	Number of graduate deans who rated information about the characteristic:* Essential (1)	Important (2)	Perhaps useful; not important (3 and 4)	Mean rating
1. Research (or other scholarly or creative) activity	Researchers	46	4		1.08
	Teachers	17	29	3	1.71
	Practitioners	15	20	14	1.98
2. Research (or other scholarly or creative) productivity	Researchers	41	7	1	1.16
	Teachers	14	20	14	2.00
	Practitioners	14	11	23	2.25
3. Academic training	Researchers	35	14	1	1.32
	Teachers	29	19	1	1.43
	Practitioners	24	23	2	1.55
4. Honors and awards; national professional recognition	Researchers	18	25	6	1.76
	Teachers	1	35	12	2.30
	Practitioners	4	25	19	2.31
5. Concern for student development and welfare	Researchers	14	22	14	2.02
	Teachers	23	21	5	1.63
	Practitioners	17	15	17	2.02
6. Teaching effectiveness	Researchers	12	26	12	2.08
	Teachers	39	10		1.20
	Practitioners	11	23	15	2.20
7. Involvement in program affairs	Researchers	12	23	13	2.08
	Teachers	11	27	9	1.96
	Practitioners	10	21	16	2.15
8. Variety of specialties among members of the faculty	Researchers	9	29	12	2.08
	Teachers	8	31	10	2.04
	Practitioners	4	34	11	2.16
9. Teaching experience	Researchers	7	22	21	2.22
	Teachers	30	14	5	1.49
	Practitioners	4	21	24	2.49
10. Group morale or esprit	Researchers	10	17	23	2.32
	Teachers	8	26	15	2.14
	Practitioners	9	23	17	2.20

*Total N=50. Rows may not add to 50 because respondents sometimes omitted an item.

CHARACTERISTICS OF FACULTY MEMBERS

Characteristic	In programs to train:	Number of graduate deans who rated information about the characteristic:* Essential (1)	Important (2)	Perhaps useful; not important (3 and 4)	Mean rating
11. Turnover	Researchers	8	19	18	2.33
	Teachers	5	16	23	2.58
	Practitioners	5	15	23	2.56
12. Concern for undergraduate learning	Researchers	4	17	29	2.72
	Teachers	22	19	8	1.78
	Practitioners	3	12	34	2.84
13. Non-university activity	Researchers	1	11	37	2.98
	Teachers	1	16	31	2.73
	Practitioners	6	18	24	2.50
14. Involvement in university affairs	Researchers		9	41	3.10
	Teachers	3	16	30	2.65
	Practitioners		5	44	3.18
15. Concern for meeting local and community needs	Researchers	3	6	41	3.14
	Teachers	5	17	27	2.71
	Practitioners	11	17	21	2.27

Table B.2

Important Information for Judgments about the Educational Quality of Ph.D. Programs:

CHARACTERISTICS OF STUDENTS

Characteristic	In programs to train:	Number of graduate deans who rated information about the characteristic:* Essential (1)	Important (2)	Perhaps useful; not important (3 and 4)	Mean rating
1. General academic ability of students entering program	Researchers	37	13		1.26
	Teachers	29	19	1	1.43
	Practitioners	27	20	2	1.49
2. Achievements, knowledge and/or skills of students at time of completion of degree	Researchers	34	14	1	1.33
	Teachers	29	16	3	1.46
	Practitioners	31	16	1	1.38
3. Professional accomplishments of graduates	Researchers	26	23	1	1.50
	Teachers	19	27	3	1.67
	Practitioners	21	22	6	1.69
4. Gains in student knowledge and/or skills during their degree program	Researchers	24	20	5	1.61
	Teachers	22	23	3	1.60
	Practitioners	25	19	5	1.67
5. Job placement of graduates	Researchers	23	23	4	1.62
	Teachers	18	26	5	1.73
	Practitioners	18	27	4	1.71
6. Career interests of students	Researchers	17	23	10	1.86
	Teachers	16	25	8	1.84
	Practitioners	15	26	8	1.86
7. Student perceptions of program quality	Researchers	4	36	10	2.12
	Teachers	4	37	8	2.08
	Practitioners	4	38	7	2.06
8. Satisfaction with various aspects of the degree program	Researchers	5	29	16	2.24
	Teachers	6	35	8	2.04
	Practitioners	5	32	12	2.14
9. Group morale or esprit	Researchers	8	22	20	2.30
	Teachers	11	24	14	2.08
	Practitioners	8	25	16	2.20

*Total N=50. Rows may not add to 50 because respondents sometimes omitted an item.

CHARACTERISTICS OF STUDENTS

Characteristics	In programs to train:	Number of graduate deans who rated information about the characteristic:* Essential (1)	Important (2)	Perhaps useful; not important (3 and 4)	Mean rating
10. Involvement in professional affairs	Researchers	5	27	17	2.37
	Teachers	1	22	25	2.56
	Practitioners	4	29	15	2.27
11. Attrition rate	Researchers	3	25	20	2.38
	Teachers	3	24	20	2.38
	Practitioners	3	24	20	2.38
12. Baccalaureate origins	Researchers	5	24	20	2.41
	Teachers	4	18	27	2.61
	Practitioners	4	20	25	2.57
13. Enrollment status of students	Researchers	2	18	19	2.62
	Teachers	1	14	22	2.73
	Practitioners	1	17	19	2.68
14. Involvement in program affairs	Researchers		17	30	2.79
	Teachers	4	19	23	2.46
	Practitioners		23	24	2.62
15. Nonacademic needs and concerns	Researchers	3	12	34	2.88
	Teachers	1	19	28	2.73
	Practitioners	1	16	30	2.81
16. Geographical origins of students	Researchers	1	6	43	3.32
	Teachers		6	43	3.35
	Practitioners		7	42	3.67
17. Involvement in institutional affairs	Researchers		4	46	3.32
	Teachers	2	11	36	2.92
	Practitioners	1	6	42	3.14

Table B.3

Important Information for Judgments about the Educational Quality of Ph.D. Programs:

CHARACTERISTICS OF RESOURCES

Characteristics	In programs to train:	Number of graduate deans who rated information about the characteristic:* Essential (1)	Important (2)	Perhaps useful; not important (3 and 4)	Mean rating
1. University financial support for the program	Researchers	37	12		1.24
	Teachers	27	21		1.44
	Practitioners	24	23	1	1.52
2. Library	Researchers	37	11	1	1.27
	Teachers	29	19		1.40
	Practitioners	25	20	3	1.54
3. Laboratory equipment and facilities (including facilities for the creative arts)	Researchers	37	11	1	1.27
	Teachers	20	21	7	1.73
	Practitioners	23	21	4	1.60
4. Computer facilities	Researchers	27	20	2	1.49
	Teachers	9	18	21	2.25
	Practitioners	11	24	12	2.04
5. External financial support for the program	Researchers	28	16	5	1.53
	Teachers	10	26	12	2.04
	Practitioners	14	26	8	1.88
6. Financial support for students	Researchers	20	22	4	1.65
	Teachers	14	21	10	1.91
	Practitioners	12	18	15	2.11
7. Purposes and strengths of parent institution	Researchers	12	32	6	1.90
	Teachers	11	33	5	1.88
	Practitioners	10	28	11	2.04
8. Classroom and office space	Researchers	5	26	19	2.32
	Teachers	4	34	11	2.14
	Practitioners	4	28	17	2.29
9. Availability/utilization of noncampus resources	Researchers	4	11	34	2.73
	Teachers		14	34	2.79
	Practitioners	3	21	24	2.46
10. Facilities for leisure time and sports activities	Researchers	1	5	44	3.28
	Teachers		5	44	3.29
	Practitioners		4	45	3.35

*Total N=50. Rows may not add to 50 because respondents sometimes omitted an item.

Table B.4

Important Information for Judgments about the Educational Quality of Ph.D. Programs:

CHARACTERISTICS OF PROGRAM OPERATION

Characteristics	In programs to train:	Number of graduate deans who rated information about the characteristic:* Essential (1)	Important (2)	Perhaps useful; not important (3 and 4)	Mean rating
1. Purposes of the program	Researchers	30	16	3	1.45
	Teachers	26	19	4	1.55
	Practitioners	26	19	3	1.52
2. Admissions policies	Researchers	26	20	3	1.53
	Teachers	23	23	2	1.56
	Practitioners	22	22	4	1.63
3. Provision for the evaluation of student progress	Researchers	20	28	1	1.57
	Teachers	20	28		1.58
	Practitioners	20	26	2	1.63
4. Course and program offerings	Researchers	24	23	3	1.58
	Teachers	24	24	1	1.53
	Practitioners	25	21	3	1.55
5. Program leadership	Researchers	22	25	3	1.62
	Teachers	22	24	3	1.61
	Practitioners	21	24	4	1.65
6. Provision for advisement of students	Researchers	20	25	5	1.70
	Teachers	18	28	3	1.69
	Practitioners	19	25	5	1.71
7. Student-faculty interaction	Researchers	21	22	7	1.72
	Teachers	21	24	4	1.65
	Practitioners	19	23	7	1.76
8. Degree requirements	Researchers	16	28	5	1.78
	Teachers	12	30	6	1.88
	Practitioners	12	31	5	1.85
9. Enrichment with visiting lecturers, colloquia, etc.	Researchers	13	32	5	1.84
	Teachers	8	34	7	1.98
	Practitioners	10	30	9	1.98

*Total N=50. Rows may not add to 50 because respondents sometimes omitted an item.

CHARACTERISTICS OF PROGRAM OPERATION

Characteristics	In programs to train:	Number of graduate deans who rated information about the characteristic:* Essential (1)	Important (2)	Perhaps useful; not important (3 and 4)	Mean rating
10. Support staff for academic program (secretaries, research assistants, teaching assistants, etc.)	Researchers	14	29	7	1.86
	Teachers	12	27	10	1.96
	Practitioners	8	31	10	2.04
11. Provision for meeting individual needs of students	Researchers	14	25	10	1.92
	Teachers	10	29	9	1.98
	Practitioners	14	24	10	1.92
12. Personal and academic freedom	Researchers	18	15	15	1.98
	Teachers	19	15	13	1.89
	Practitioners	18	11	18	2.02
13. Relationships with cognate programs	Researchers	9	29	12	2.06
	Teachers	10	29	10	2.00
	Practitioners	8	27	14	2.12
14. Efficiency of degree production	Researchers	7	29	9	2.07
	Teachers	5	30	9	2.11
	Practitioners	6	31	7	2.05
15. Size of the program	Researchers	8	30	11	2.12
	Teachers	8	26	15	2.16
	Practitioners	8	23	17	2.23
16. Plans for the future of the program	Researchers	11	23	16	2.14
	Teachers	10	24	15	2.14
	Practitioners	10	24	15	2.14
17. Internships or other opportunities for relevant student experiences	Researchers	10	21	18	2.20
	Teachers	21	23	4	1.65
	Practitioners	23	21	5	1.65
18. Postdoctoral study opportunities	Researchers	10	19	19	2.21
	Teachers	1	10	36	2.87
	Practitioners	1	13	33	2.83
19. Recent innovations	Researchers	8	21	19	2.27
	Teachers	7	27	13	2.17
	Practitioners	7	24	16	2.21

CHARACTERISTICS OF PROGRAM OPERATION

Characteristics	In programs to train:	Number of graduate deans who rated information about the characteristic:* Essential (1)	Important (2)	Perhaps useful; not important (3 and 4)	Mean rating
20. Program decision-making structure	Researchers	6	22	21	2.31
	Teachers	4	24	27	2.77
	Practitioners	4	22	22	2.38
21. Competitiveness among students	Researchers	5	17	27	2.63
	Teachers	1	19	28	2.75
	Practitioners	2	15	31	2.79

Appendix C

The Adequacy and Availability of Measures that might be Used as Indicators of a Program Characteristic

Notes

1. Raters were asked to answer the following questions about each program characteristic:

   Q.1 a) In your opinion, how adequate or appropriate is the measure as an indicator of the quality of the listed program characteristic? Circle one letter for each measure, using the following key:

   VG = very good indicator
   G = good indicator
   P = poor indicator, but useable
   I = inadequate indicator; not useable

   b) From all of the possible measures for each characteristic, including any you may have added, double circle your rating of the one measure for each characteristic that you would prefer to see used as an indicator of program quality. In making this judgment you may want to consider practical problems of gathering the information as well as it's more abstract desirability.

   Q.2 Is this information currently available through the program or dean's office at your university? Circle one letter using the following key:

   Y = yes, information could be supplied from records without new data collection
   N = no, information is not available at present
   V = varies from program to program, or not sure whether available or not

   Since judgments about the relative importance of the various characteristics in different kinds of programs were available from the earlier survey, this questionnaire did not ask respondents to make distinctions among programs emphasizing the preparation of research scholars, college teachers, or professional practitioners.

2. Total number of respondents is 43. Frequency tabulations ("preference" column; "adequacy" and "availability" rows) may not add to 43 because of omissions. The omission rate was slightly higher on the "availability" question than on the "adequacy" question, particularly in the last section.

3. Frequency tabulations for "other" measures indicate the number of persons who wrote in some additional way to measure the characteristic. Mean ratings and "availability" are not reported for these write-in measures.

4. Program characteristics and possible measures appear in these tables exactly as they appeared in the second questionnaire; the only change is that tabulated response frequencies replace the questionnaire's response options.

Table C.1

FACULTY characteristics and possible measures	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
1. Academic training of faculty								
a. Percent with Ph.D.'s or equivalent degrees	14	20	19	4	3.37	42		
b. Percent of Ph.D.'s from "top" programs in each field, as defined by a reputational survey	18	20	18	5	3.33	28	6	8
c. Average grades in graduate school	0	1	13	29	2.09	7	25	11
d. Percent who held national fellowships as graduate students or post-doctoral fellowships since graduation	4	6	24	12	2.86	11	11	20
e. Appropriateness of specialty areas of training to purposes of the program, as evaluated by a visiting team of experts	4	11	22	10	3.00	5	16	19
f. Percent of enrolled students who rate the academic achievement of faculty members "excellent"	2	6	16	21	2.49	2	28	12
g. Other (write in) _____	1	2	4					
_____								
(Double-circle one measure you prefer)								
2. Research (or other scholarly or creative) Activity								
a. Average number research projects in progress per FTE faculty	11	14	19	10	3.02	23	9	10
b. Average number research proposals funded in the last three years per FTE faculty	13	19	22	2	3.40	33	4	5
c. Average percent of faculty time spent in basic research (or equivalent)	2	6	22	15	2.70	14	14	13
d. Average percent of faculty time spent in applied research (or equivalent)	0	3	20	20	2.53	11	15	14
e. Average number research assistants per FTE faculty	0	2	11	30	2.14	25	5	8
f. Percent of faculty actively involved in the publication of research results (journal editor, editorial board member, referee for submitted articles, etc.)	6	15	24	4	3.26	21	10	9
g. Average number invited presentations of research results in the past year (visiting lectures, colloquia, workshops, professional meetings, etc.) per FTE faculty	7	17	23	3	3.33	16	9	14
h. Other: _____	3	4	1					
_____								
(Double-circle one measure you prefer)								

FACULTY characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy — Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability: Yes	No	Varies
3. Research (or other scholarly or creative) productivity								
a. Average number books authored and published in the last three years per FTE faculty	2	19	20	4	3.3[illegible]	32	6	5
b. Average number edited books, book chapters, or monographs published in the last three years per FTE faculty	1	9	31	3	3.14	29	7	6
c. Average number journal articles published in the last three years per FTE faculty	4	24	17	2	3.51	29	6	7
d. Weighted average number publications (giving progressively more weight to refereed journals, single authorship of articles, senior authorship of books, etc.) in the past three years (sub. no. patents or artistic performances or products where appropriate)	33	35	6	2	3.74	12	18	11
e. Percent of faculty who have published at least one item in the last year	1	6	23	14	2.81	29	10	2
f. Average publications citation rate over the past three years	1	13	21	9	3.07	12	18	10
g. Average number technical papers or project reports prepared in the last three years	0	1	27	15	2.65	17	11	9
h. Other: (write in) _____	1	1	1					
(Double-circle one measure you prefer)								
4. Honors and awards; national professional recognition								
a. Average reputational rating of the faculty among colleagues (cf, ACE ratings)	13	12	25	6	3.14	16	13	11
b. Average number professional honors and awards per FTE faculty over the past three years	17	19	19	5	3.33	15	9	17
c. Average number professional assn. offices, committee chairmanships, traveling lectureships, etc., per FTE faculty over the past three years	5	9	23	11	2.93	14	9	17
d. Other: (write in) _____	2	1	1					
(Double-circle one measure you prefer)								

FACULTY characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
5. Concern for student development and welfare								
a. Average student (or former student) rating on a scale measuring faculty concern for student development and welfare, accessibility, advising skill, etc.	25	15	23	5	3.23	3	25	15
b. Percent of faculty time spent in conferences or informal contacts with students	2	4	23	15	2.74	3	29	10
c. Reputational judgments by colleagues	8	8	22	13	2.86	2	32	7
d. Avg. no. of posted office hours per week per FTE faculty	0	0	1	42	1.56	14	18	10
e. Tendency for faculty to see students as colleagues, apprentices, employees, or students as rated by:								
1) students	4	9	13	14	2.83	2	26	5
2) faculty members	0	4	16	15	2.69	1	28	4
3) program chairman	1	3	18	14	2.63	2	26	5
f. Other:_____	0			1				
(Double-circle one measure you prefer)								
6. Teaching effectiveness								
a. Avg. ratings by students on a course and teacher evaluation form	16	11	23	7	3.10	9	10	23
b. Avg. ratings by colleagues on a course and teacher evaluation form, with or without class visits	5	5	20	16	2.63	1	30	10
c. Number of awards for good teaching in the past three years	0	4	11	27	2.31	22	10	9
d. Presence of innovative teaching procedures and/or outstanding instructional materials, as judged by:								
1) students	2	8	24	10	2.93	5	20	13
2) program chairman and/or graduate dean	3	5	22	15	2.69	4	22	12
3) visiting panel of experts	7	13	20	9	3.10	3	24	12
e. Increase in knowledge of students, as demonstrated on course final exams or standardized tests	6	7	15	19	2.63	3	27	8
f. Other: _____								
(Double-circle one measure you prefer)								

FACULTY characteristics and possible measures (cont.)	Q.1 Adequacy: Preferred by:	Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability* Yes	No	Varies
7. Teaching experience								
a. Avg. no. of years of teaching experience	2	2	19	22	2.42	33	6	3
b. Avg. no. of years of teaching experience at the college or university level in appropriate area of specialty	31	13	19	10	3.05	30	6	5
c. Age	0	0	1	42	1.58	36	2	2
d. Other: _____	2	2						
(Double-circle one measure you prefer)								
8. Involvement in program affairs								
a. Faculty satisfaction with influence on important decisions concerning the program	16	13	27	3	3.21	3	25	15
b. Percent of faculty serving on one or more program/department committees	4	5	21	17	2.65	20	15	8
c. Faculty degree of agreement with and commitment to the purposes and goals of the program	20	15	24	4	3.26	2	28	13
d. Low turnover rate	0	1	11	30	2.02	32	7	1
e. Other: _____	0		1					
(Double-circle one measure you prefer)								
9. Group morale or esprit								
a. Avg. faculty-reported satisfaction with program leadership, enthusiasm for the program, loyalty, involvement, etc.	22	22	17	3	3.45	4	22	13
b. Low turnover rate	0	1	15	27	2.16	30	6	5
c. Relative vitality vs. malaise among the faculty, as rated by a visiting panel of experts	6	15	23	5	3.23	4	24	12
d. Faculty sense of community, feeling of shared interests and involvement in worthwhile activities, as rated by:								
1) faculty members	6	17	20	4	3.32	2	25	11
2) program chairman and/or graduate dean	0	5	25	11	2.80	7	20	11
3) visiting panel of experts	1	11	23	8	3.07	3	23	12

(continued)

FACULTY characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
e. Avg. self-reported informal social interchange and camaraderie among the faculty	0		18	25	2.26		34	5
f. Other: _____	1	1						
(Double-circle one measure you prefer)								
10. Concern for undergraduate learning								
a. Faculty-reported sensitivity to the interests, needs, and aspirations of undergraduates	15	9	20	13	2.86	1	29	10
b. Avg. percent of workload over past three years devoted to teaching undergraduates	2	4	17	22	2.53	26	8	6
c. Percent of graduate faculty who teach at least one undergraduate course per year	6	8	23	12	2.86	29	6	5
d. Avg. years of undergraduate teaching experience per FTE faculty	0	2	14	27	2.21	18	16	6
e. Quality of a program to train and supervise teaching fellows, as rated by:								
1) students	6	12	22	7	3.12	3	25	11
2) faculty members	1	4	31	6	2.95	1	26	12
3) program chairman and/or grad dean	0	0	28	12	2.68	5	26	8
4) visiting panel of experts	3	10	21	11	2.93	2	29	8
f. Other: _____	1	1						
(Double-circle one measure you prefer)								

Table C.2

STUDENT characteristics and possible measures	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
1. General academic ability of students entering the program								
a. Avg. undergraduate GPA	15	18	23	2	3.37	34	4	2
b. Avg. score on graduate aptitude test (GRE, MAT, etc.)	12	21	19	3	3.42	29	3	9
c. Avg. score on appropriate GRE Advanced Test (or other ach. test)	3	11	26	6	3.09	26	4	11
d. Percent of enrolled students with national fellowships (NSF, Woodrow Wilson, etc.)	4	12	23	8	3.07	28	8	5
e. Percent of entering students from highly selective undergraduate institutions	5	9	26	8	2.98	23	10	8
f. Percent of enrolled students who rate the academic ability of their fellow students "excellent"	2	3	19	21	2.51	1	36	3
g. Other: _____	1	3	1					
(Double-circle one measure you prefer)								
2. Achievements, knowledge, and/or skills of students at time of completion of degree								
a. Percent of graduates in the last three years who published something prior to the degree	10	16	21	5	3.24	12	18	11
b. Percent of graduates in the last three years who obtained employment directly related to their field of specialization	11	19	19	5	3.33	20	10	11
c. Excellence or uniqueness of dissertations and theses in the last three years, as evaluated by external judges	11	23	17	3	3.47	2	32	7
d. Avg. student score on a standardized test developed by experts in the field	2	2	22	19	2.53	1	34	6
e. Avg. supervisor evaluation of internship/assistantship performance	1	1	24	18	2.56	7	20	13
f. Avg. student performance on an oral exam at the end of the program	1	5	20	18	2.60	15	16	9
g. Avg. performance on standardized licensing or other professional-level entrance exams	1	2	25	16	2.58	5	24	11
h. Percent of graduates in the last three years offered postdoctoral fellowships	1	8	22	13	2.77	15	13	11
i. Other: _____								
(Double-circle one measure you prefer)								

STUDENT characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
3. Gains in student knowledge and/or skills during their degree program								
a. Avg. evaluation by faculty advisers and by assistantship/internship supervisors of the "growth" observed in students over a two year period	17	11	26	6	3.12	8	27	7
b. Avg. student-reported score on a scale measuring degree of satisfaction with gains in knowledge and/or skills during enrollment	3	5	21	17	2.70	3	34	5
c. Avg. gains scores (pre-post) on a standardized test developed by experts in the field	6	3	25	15	2.67	2	34	5
d. Avg. evaluation of gains in knowledge and skills by recent alumni	11	10	14	18	2.67	1	32	8
e. Other: _____ (Double-circle one measure you prefer)	1	1						
4. Professional accomplishments of graduates								
a. Avg. no. publications by those who graduated in the last five years	9	18	21	4	3.30	4	26	11
b. Percent of graduates who have received one or more professional awards or honors in the past three years	2	13	21	9	3.02	5	24	11
c. Percent of graduates currently employed by doctorate-awarding universities	5	13	24	6	3.09	14	15	11
d. Percent of graduates occupying positions of leadership and influence in the field, as judged by:								
1) program chairman	3	8	25	10	2.91	3	26	12
2) outside experts	10	21	17	5	3.37	1	31	8
e. Avg. income of graduates at specified intervals (perhaps 1, 5, 10, and 20 years)	0	1	14	28	2.26	0	39	2
f. Alumni rating of satisfaction with professional career performance and development	0	6	23	13	2.81	0	31	10
g. Percent of graduates listed in "Who's Who"	1	5	16	22	2.49	10	28	3
h. Avg. rating by employers on knowledge, skill, and performance of recent graduates	5	9	31	3	3.14	0	33	8
i. Avg. reputation among faculty at other universities	4	11	24	8	3.05	1	32	8
j. Other: _____ (Double-circle one measure you prefer)								

STUDENT characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
5. Career interests of students								
a. Congruence of student career interests with program purposes and emphases, as judged by enrolled students	19	12	23	6	3.10	3	30	7
b. Percent of students aiming for specified kinds and levels of employment, as estimated by program chairman	2	3	22	16	2.56	3	28	9
c. Self-reported career plans of entering students	0	3	17	21	2.56	6	30	4
d. Self-reported career plans of degree recipients	6	7	25	9	2.93	7	23	10
e. Avg. student score on a scale of professional involvement or commitment	2	2	16	23	2.41	1	37	2
f. Low student attrition rate	5	4	12	24	2.33	27	10	3
e. Other: _____ (Double-circle one measure you prefer)								
6. Student perceptions of program quality								
a. Avg. student rating of the value of specified academic experiences in the program	5	6	31	6	2.98	3	30	7
b. Avg. alumni (1-5 years) rating of experiences in the program	31	27	14	2	3.58	1	33	6
c. Ratio of inquiries and applications for admission to number of students admitted each year	5	6	19	18	2.65	28	8	4
d. Other: _____ (Double-circle one measure you prefer)								
7. Satisfaction with various aspects of the degree program								
a. Avg. no. complaints made to student complaint committee	0	0	12	31	2.05	7	30	4
b. Percent of students who would recommend the program to others with similar interests and abilities	22	18	24	1	3.40	2	29	9

(continued)

STUDENT characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
c. Avg. student-rated satisfaction with specified academic and non-academic aspects of the program	11	8	29	6	3.02	4	28	8
d. Low student attrition rate	3	2	15	26	2.28	24	11	6
e. Other: _____	1	1						
(Double-circle one measure you prefer)								
8. Group morale or esprit								
a. Avg. student-reported score on a scale measuring satisfaction with program	11	7	25	11	2.86	3	31	4
b. Avg. student satisfaction with rate of academic progress	5	6	27	10	2.88	3	27	8
c. Avg. student perception of degree of support from vs. competition with other students in the program	2	0	23	20	2.42	1	32	4
d. Student sense of community, feeling of shared interests and involvement in worthwhile activities, as rated by:								
1) students	10	17	23	3	3.30	4	28	7
2) faculty members	0	5	24	14	2.72	4	27	8
3) program chairman	0	3	23	17	2.60	5	26	8
4) visiting panel of experts	5	6	19	18	2.60	4	30	5
e. Low student attrition rate	1	1	13	24	2.18	18	10	7
f. Other: _____								
(Double-circle one measure you prefer)								

Table C.3

RESOURCES and possible measures	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
1. University financial support for the program								
a. Ratio of program budget allocation to total university allocation for Ph.D. study	10	9	16	15	2.83	22	11	5
b. Median faculty salary by rank	1	5	21	15	2.66	35	2	1
c. Education and general expense budget per FTE student	6	10	22	9	3.00	30	6	2
d. University support as a percent of total program budget	6	8	22	10	2.90	32	3	2
e. Judgments about the adequacy of university support relative to program purposes by a visiting team of experts	13	12	23	6	3.10	5	20	11
f. Other: _____	2	1	1					
(Double-circle one measure you prefer)								
2. Library								
a. Adequacy of relevant holdings as judged by:								
1) visiting team of experts	19	22	17	3	3.45	9	19	12
2) faculty members	11	20	20	2	3.43	12	16	12
3) students	3	5	30	7	2.93	6	25	9
4) librarians	1	5	30	7	2.95	15	17	8
5) program chairman	0	10	26	6	3.07	10	21	9
b. Avg. no. books in the field per FTE student	0	2	19	21	2.45	18	17	5
c. Program library budget per FTE student	1	5	27	10	2.81	23	13	4
d. Avg. self-reported use of the library by students and faculty members	0	3	15	24	2.36	5	28	5
e. Avg. no. books and other materials checked out per FTE student in the past six months.	3	4	9	29	2.21	11	20	7
f. Existence of other accessible libraries in the vicinity, as reported by program chairman	0	2	22	18	2.57	16	14	8
g. Other: _____	1		1					
(Double-circle one measure you prefer)								

RESOURCES and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
3. Laboratory equipment and facilities (including facilities for the creative arts)								
a. Square feet of laboratory and/or studio space per FTE student	1	7	26	10	2.88	27	6	8
b. Presence of laboratory/creative equipment considered essential or important by experts in the field	18	27	14	2	3.56	11	13	17
c. Adequacy of laboratory equipment and facilities as rated by:								
1) faculty members	12	19	22	2	3.40	10	19	11
2) students	0	5	32	6	2.98	5	25	10
3) visiting team of experts	8	24	18	1	3.53	7	22	11
d. Existence of other accessible facilities in the vicinity, as reported by program chairman	1	2	22	19	2.51	15	16	9
e. Other: _____								
(Double-circle one measure you prefer)								
4. Computer facilities								
a. Adequacy of computer facilities for needs of the program as rated by:								
1) program chairman	2	11	28	4	3.14	14	17	9
2) faculty members	9	17	25	1	3.37	13	18	9
3) students	3	10	28	5	3.12	10	22	8
4) visiting team of experts	14	21	20	2	3.44	6	22	12
b. Adequacy of software and computer support services to meet needs of the program as rated by:								
1) program chairman	1	10	28	4	3.12	12	17	10
2) faculty members	2	20	21	2	3.42	9	19	11
c. Program budget (money and/or time) for use of computer facilities per FTE student	5	12	20	11	2.95	23	12	5

(continued)

RESOURCES and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
d. Existence of other accessible computers in the vicinity, as reported by program chairman	1	1	25	17	2.56	17	14	9
e. Other: _____								
(Double-circle one measure you prefer)								
5. External financial support for the program								
a. Avg. dollar income per FTE faculty from outside sources over the past three years	19	17	22	4	3.28	26	9	4
b. Outside funds as a percent of total program budget	15	19	23	1	3.42	28	5	5
c. Dollar amount of federal research project grants and contracts over the past three years	5	13	26	4	3.16	33	2	4
d. Other: _____	2	3						
(Double-circle one measure you prefer)								
6. Financial support for students								
a. Avg. dollars for all forms of financial assistance per FTE student	21	21	19	2	3.45	29	3	6
b. Percent of students receiving any form of financial assistance	10	12	26	5	3.14	31	2	5
c. Ratio of students on fellowships or grants to those on assistantships	1	3	18	22	2.40	30	3	4
d. Percent of students who hold fellowships or grants from external sources	5	11	23	9	2.98	33	2	3
e. Percent of students or spouses assisted in obtaining appropriate employment to support graduate study	0	1	11	31	2.16	5	22	10
f. Percent of students working on dissertations full-time	1	5	17	21	2.49	19	11	7
g. Other: _____								
(Double-circle one measure you prefer)								

RESOURCES and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
7. Purposes and strengths of parent institution								
a. Reputation of university as rated by knowledgeable educators	14	22	20	1	3.49	9	18	13
b. Number of doctoral programs in related fields within the university	3	8	24	11	2.81	34	3	3
c. Congruence of program and university purposes as judged by:								
1) visiting panel of experts	6	15	22	5	3.19	7	17	13
2) program chairman and/or graduate dean	3	6	28	7	2.88	14	16	7
3) faculty members	3	4	31	7	2.86	8	19	10
4) colleagues in similar programs at other universities	0	5	25	12	2.79	1	25	11
d. Level of support for the program from central university administrators, as judged by:								
1) visiting panel of experts	5	15	19	9	3.07	5	20	13
2) program chairman and/or graduate dean	1	9	25	9	2.93	15	15	8
3) faculty members	1	4	29	11	2.79	8	20	10
e. Level of admissions selectivity in the larger university relative to the program under study	3	6	23	14	2.67	20	11	8
f. Other: _____								
(Double-circle one measure you prefer)								
8. Classroom and office space for the program								
a. Avg. square feet of instructional space per FTE student	5	5	24	14	2.74	27	10	1
b. Avg. square feet of office and research space per FTE faculty	6	7	27	9	2.91	26	9	3
c. Percent of faculty members in single-person offices	0	0	25	18	2.49	24	9	5
d. Adequacy of classroom and office space as rated by:								
1) students	1	2	24	17	2.60	5	26	7
2) faculty members	8	5	30	8	2.91	8	21	9
3) program chairman and/or graduate dean	3	2	32	9	2.79	10	19	8
4) visiting team of experts	14	12	22	9	3.05	6	20	12
e. Other: _____	1	1						
(Double-circle one measure you prefer)								

Table C.4

OPERATIONAL characteristics and possible measures	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
1. Purposes of the program								
a. Clarity of program purposes and plans, as judged by:								
1) faculty members	9	13	26	4	3.19	7	21	12
2) program chairman and/or graduate dean	4	13	25	5	3.14	10	19	11
3) visiting panel of experts	10	18	20	5	3.28	3	22	15
4) students	2	2	33	8	2.84	2	27	11
5) recent graduates	6	15	24	3	3.26	1	28	11
b. Ratio of graduate to undergraduate students in the program	1	1	10	30	2.00	34	2	5
c. Ratio of graduate to undergraduate degrees awarded	0	1	9	31	1.95	34	2	4
d. Relative emphasis on research, teaching, and service, as judged by:								
1) faculty members	2	8	27	8	2.95	12	20	7
2) program chairman and/or graduate dean	2	8	29	6	2.98	12	19	8
3) visiting team of experts	1	12	22	9	3.05	4	22	13
e. Number of areas of specialization within the program	0	2	11	29	2.21	29	5	5
f. Ratio of part-time to full-time students enrolled	0	4	13	26	2.28	27	5	6
g. Other: _____	0	0						2
(Double-circle one measure you prefer)								
2. Admissions policies								
a. Percent of qualified applicants who are admitted, as reported by the admissions committee	9	13	23	7	3.09	29	2	7
b. Relative selectivity of graduate and undergraduate students, as reported by the admissions committee	10	15	17	10	3.07	23	9	5
c. Annual recruiting and admissions processing cost per FTE student	0	2	5	36	1.98	11	23	4

(continued)

OPERATIONAL characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
d. Judgment of whether admissions standards should be higher or lower, as rated by:								
1) students	1	5	17	20	2.57	3	28	8
2) faculty members	4	11	24	8	3.05	9	18	12
3) program chairman	2	8	27	8	2.98	10	19	10
4) visiting panel of experts	12	19	20	3	3.38	5	21	12
e. Clarity of admissions procedures and standards, as judged by:								
1) visiting panel of experts	0	9	27	7	3.00	5	24	9
2) students	1	5	24	14	2.67	1	29	8
3) prospective students	0	6	21	16	2.63	1	31	6
f. Other: _____	2	?	2	1				
(Double-circle one measure you prefer)								
3. Provision for the evaluation of student progress								
a. Clarity of requirements and standards for progression from entrance to candidacy with stated times for review and evaluation, as judged by:								
1) program chairman	9	14	23	6	3.16	13	20	7
2) students	9	12	26	5	3.14	7	25	8
3) visiting panel of experts	11	14	24	5	3.16	5	27	8
b. Student-reported satisfaction with their progress toward the degree	3	8	24	11	2.88	5	20	13
c. Quality and regularity of reports from internship/assistantship supervisors, as judged by:								
1) visiting panel of experts	0	3	24	16	2.65	2	26	12
2) faculty advisers	2	5	26	12	2.79	6	25	9
d. Percent of students who spend 18 months or more in full-time enrollment (including assistantships/internships)	0	1	13	28	2.19	23	12	5
e. Distribution of grades assigned to doctoral students	0	0	5	38	1.84	28	8	3
f. Other: _____	4	3	1	0				
(Double-circle one measure you prefer)								

OPERATIONAL characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
4. Course and program offerings								
a. Courses and other available experiences appropriate to purposes of the program and specialty training of the faculty, as judged by:								
1) faculty members	10	16	22	5	3.26	8	21	11
2) students	0	11	23	9	3.05	4	23	13
3) visiting panel of experts	19	27	13	3	3.56	4	20	16
b. Percent of total student credit hours produced by seminars and tutorials	1	2	17	24	2.26	23	10	7
c. Avg. student ratings on the variety and relevance of course offerings	4	4	24	15	2.72	4	23	13
d. No. of new or completely revised courses in the last two years	0	1	10	31	2.12	20	13	7
e. Ease with which new courses can be introduced, as judged by faculty members	0	1	18	24	2.35	6	25	9
f. Relative need for curriculum review and updating as judged by a visiting panel of experts	5	17	20	4	3.32	4	21	14
g. Other: _____	0	1	1					
(Double-circle one measure you prefer)								
5. Program leadership and decision-making								
a. Quality of leadership provided by the program chairman as judged by:								
1) faculty members	14	20	20	3	3.37	7	17	16
2) graduate dean	8	20	20	3	3.40	16	15	9
3) visiting panel of experts	9	22	18	3	3.44	4	19	17
b. Faculty self-reported activity and influence in the larger university community	0	3	21	19	2.51	7	23	10
c. Extent of democratic or decentralized decision-making in the program, as rated by:								
1) faculty members	2	5	20	16	2.63	6	24	10
2) students	0	2	10	29	2.22	1	29	10
3) program chairman	0	2	20	19	2.44	6	24	10
4) visiting panel of experts	1	7	17	17	2.63	3	26	11

(continued)

OPERATIONAL characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
d. Satisfaction with opportunity to influence decisions as rated by:								
1) faculty members	2	8	25	9	2.90	6	23	10
2) students	3	3	19	20	2.52	3	25	11
3) alumni	0	1	13	28	2.17	1	28	10
e. Other: _____	1	1	0	2				
(Double-circle one measure you prefer)								
6. Provision for the welfare of faculty members								
a. Percent of faculty with the rank of professor and associate professor	1	6	17	20	2.51	37	1	0
b. Percent of faculty with tenure	1	5	19	19	2.51	38	1	0
c. Median salary by rank	9	16	27	2	3.26	37	1	1
d. Excellence of fringe benefits package, as judged by:								
1) faculty members	0	9	25	9	2.91	14	19	6
2) outside experts	1	10	27	4	3.10	7	26	6
e. Number of faculty members who left and number who have been replaced in the last three years as a percent of total number of graduate faculty	2	5	15	22	2.45	29	6	4
f. Provision for assistance to new and young faculty, as judged by:								
1) faculty members	3	9	26	7	3.00	6	20	12
2) visiting panel of experts	3	9	27	6	3.07	3	26	9
g. Faculty satisfaction with the quantity and quality of support staff	2	6	30	7	2.91	4	22	13
h. Faculty satisfaction with freedom to plan courses and conduct research without internal or external interference	8	12	24	6	3.07	4	24	11
i. Faculty satisfaction with freedom to pursue personal life without internal or external interference	0	12	17	14	2.91	5	25	9
j. Extent of department and university support for the principle of academic freedom, as judged by outside experts	5	15	23	5	3.23	6	25	8
k. Average teaching load	1	11	32	8	3.02	26	6	4
l. Other: _____	4	4						
(Double-circle one measure you prefer)								

OPERATIONAL characteristics and possible measures (con.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
7. Job placement of graduates								
a. Satisfaction with program efforts to place graduates, as judged by:								
1) students	6	20	17	6	3.26	5	22	12
2) faculty members	0	7	28	8	2.91	5	21	13
3) visiting panel of experts	3	8	27	3	2.95	2	26	11
b. Percent of degree recipients in last three years who were placed in positions directly relevant to their graduate education	17	26	16	1	3.58	18	8	14
c. Percent of recent graduates who joined faculties at major doctorate-producing universities	3	15	21	7	3.07	22	8	10
d. Profile of jobs taken by former students and graduates in the last three years	8	10	25	7	3.00	6	17	16
e. Other: _____	1	2						
(Double-circle one measure you prefer)								
8. Provision for the advisement of students								
a. Quality of the advising system, as rated by:								
1) students	12	19	23	1	3.42	3	23	13
2) faculty members	0	6	27	10	2.88	6	20	13
3) visiting panel of experts	2	11	24	8	3.02	3	25	11
4) recent graduates	17	20	21	2	3.42	1	26	12
b. Avg. no. advisees per faculty adviser	3	4	23	16	2.67	22	9	8
c. Avg. no. dissertations or theses directed by each faculty member	1	7	22	13	2.74	26	5	7
d. Other: _____	1	1	1					
(Double-circle one measure you prefer)								

OPERATIONAL characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability: Yes	No	Varies
9. Student-faculty interaction								
a. Avg. no. student-reported informal contacts with faculty members in a typical semester	6	7	21	15	2.70	1	32	8
b. Avg. no. faculty-reported individual conferences with students in a typical week	1	9	18	16	2.74	4	30	7
c. Avg. no. faculty-reported hours per week available to students for questions or consultation	2	5	14	24	2.47	8	26	7
d. No. students and faculty members who serve on joint student-faculty committees	2	4	16	23	2.40	18	13	10
e. Avg. faculty and student scores on a scale measuring the relative faculty perception of students as colleagues, apprentices, employees or students	3	3	18	21	2.48	1	36	4
f. Student-reported satisfaction with opportunity to work closely with at least one member of the faculty	20	21	20	2	3.42	2	28	11
g. Provision for informal lounge space used jointly by students and faculty	1	2	26	15	2.65	18	13	10
h. Other: _____ (Double-circle one measure you prefer)								
10. Degree requirements								
a. Flexibility of program requirements sufficient to meet individual student needs, as judged by:								
1) students	7	11	26	4	3.15	3	26	10
2) faculty members	2	10	23	8	3.02	7	22	10
3) visiting panel of experts	14	16	21	3	3.33	4	23	12
b. Percent of students who undertake a research project (other than dissertation)	2	5	13	23	2.39	8	22	9
c. Percent of students who serve an apprenticeship or assistantship (appropriate area of professional specialty or teaching)	1	6	21	14	2.68	21	11	7
d. Percent of the program required in full-time residence	0	3	21	17	2.59	29	6	4
e. Percent of total requirements (credit hours or time) specified in a common core of courses and experiences	0	3	17	21	2.46	25	7	7

(continued)

OPERATIONAL characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
f. Avg. percent of annual first-year students who are dropped for inadequate scholarship or refused advancement to candidacy within four years (or equivalent)	2	6	16	19	2.54	20	13	7
g. Clarity of specified competencies and qualities expected of graduates preparing to be researchers, teachers, or professional practitioners, as evaluated by:								
1) faculty members	1	12	25	4	3.17	6	23	11
2) students	0	9	27	5	3.07	4	26	10
3) visiting panel of experts	4	14	21	5	3.20	4	26	9
h. Percent of students on individually planned programs each year	0	9	14	16	2.72	16	15	7
i. Other: _____	2	2						
(Double-circle one measure you prefer)								
11. Enrichment with visiting lecturers, colloquia, etc.								
a. No. visiting lecturers, colloquia, etc., scheduled in the past six months	20	23	15	4	3.43	21	7	11
b. Avg. attendance per scheduled lecture, colloquium, etc.	2	8	21	13	2.81	4	25	10
c. Satisfaction with enrichment efforts of the program as rated by:								
1) students	4	12	24	6	3.12	3	22	12
2) faculty members	2	11	26	5	3.12	6	21	10
3) visiting panel of experts	8	13	20	7	3.13	2	23	12
d. Other: _____	1	1						
(Double-circle one measure you prefer)								
12. Relationships with cognate programs								
a. Percent of program students enrolled for one of more courses in another department	11	14	22	6	3.14	22	11	7
b. Percent of students registered for an interdepartmental program	2	6	22	13	2.78	20	11	9

(continued)

OPERATIONAL characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
c. Relationships and interchanges with cognate programs as rated by:								
1) faculty members	6	6	31	4	3.05	8	22	10
2) students	3	7	29	5	3.05	6	24	10
3) program chairman and/or graduate dean	7	8	30	3	3.10	10	20	10
4) chairmen of cognate departments	3	5	32	2	3.05	9	19	10
d. Percent of courses that are cross-listed with another department	3	7	14	21	2.57	26	6	7
e. Avg. student credit hours in program courses each semester that are produced by students enrolled in other programs	3	11	12	16	2.82	18	12	8
f. Other: _____	0			1				
(Double-circle one measure you prefer)								
13. Efficiency of degree production								
a. Percent of those who enroll who earn the Ph.D.	18	21	20	1	3.45	31	6	3
b. Percent of those who enroll who achieve candidacy	0	6	24	12	2.76	28	8	4
c. Median number quarters or semesters in attendance that are needed to complete the degree	5	9	23	10	2.86	24	8	8
d. Estimated total avg. time required to achieve candidacy	0	5	28	9	2.83	21	10	8
e. Estimated total avg. time required to complete the degree	4	11	27	4	3.14	25	8	6
f. No. of degrees awarded in each of the past four years	1	4	19	19	2.55	35	2	2
g. Ratio of doctorates awarded to no. of graduate faculty and to no. of enrolled students	10	12	21	8	3.02	28	6	5
h. Other: _____	0	1						
(Double-circle one measure you prefer)								
14. Size of the program								
a. No. of enrolled students and first-year students in each of the past four years, by full-time and part-time	20	19	19	4	3.31	36	2	2
b. No. of postdoctoral students enrolled in each of the past four years	1	3	16	23	2.36	29	7	4

(continued)

OPERATIONAL characteristics and possible measures (cont.)	Preferred by:	Q.1 Adequacy Rated as: Very Good (4)	Good (3)	Poor or Inad. (2 and 1)	Mean rating	Q.2 Availability Yes	No	Varies
c. No. of graduate faculty members in each of the past four years, by full-time and part-time	2	8	27	7	3.0	33	5	1
d. Student/faculty ratio	12	14	20	8	3.07	36	1	2
e. No. of years since the program first awarded a Ph.D.	1	2	10	29	2.05	34	3	1
f. Other: _____	1	2						
(Double-circle one measure you prefer)								
15. Plans for the future of the program								
a. Appropriateness and detail of middle-range and long-range plans for the program, as evaluated by:								
1) program chairman and/or graduate dean	8	9	26	6	3.02	13	17	10
2) faculty members	5	8	28	5	3.07	8	19	12
3) visiting panel of experts	20	18	20	3	3.37	5	20	15
b. Other: _____	2	2						
(Double-circle one measure you prefer)								
16. Internships or other opportunities for relevant student experiences								
a. Percent of students who hold a teaching assistantship in the course of their attendance	4	11	27	4	3.12	30	5	4
b. Percent of students who hold a research assistantship in the course of their attendance	4	13	25	4	3.14	30	5	4
c. Percent of students who hold an apprenticeship or other pre-professional work assignment in the course of their attendance	3	11	24	7	3.07	20	11	8
d. Avg. elapsed time per student from enrollment to first research or internship experience	1	2	16	24	2.31	9	21	9
e. Value of the internship or assistantship as rated by students who have completed the experience	20	16	24	2	3.31	6	22	11
f. Percent of research assistants who are assigned to individual faculty members who are doing research rather than to a project, laboratory, or center	1	6	20	15	2.66	10	19	9
g. Other: _____	1	2	1					
(Double-circle one measure you prefer)								

Appendix D

Ranked Importance of Major Tasks of Ph.D. Programs in Fifty-four Universities

Graduate deans in the sample were asked to rank the major tasks of their own institutions' Ph.D. programs in the order of their importance in the physical sciences, biological sciences, social sciences, and humanities. In general, training research scholars ranked first in the physical and biological sciences, training college teachers ranked first in the humanities, and training research scholars and college teachers received about equal weight in the social sciences. Training professional practitioners ranked third in all four curricular areas, highest in the social sciences and lowest in the humanities. Frequency tabulations and mean ranks are presented in Table D.1.

Ranks assigned to each task in each curricular area were also examined for differences depending upon the respondent's field of specialization or the characteristics of the universities represented in the sample. Size of graduate enrollment was not a factor, but deans employed by private and high-prestige universities reported more emphasis on the training of research scholars in all four areas, while representatives of public and non-prestige universities gave slightly higher ratings to the training of college teachers and professional practitioners in all areas. Deans trained in the social sciences and humanities reported that the physical and biological science departments in their universities strongly emphasized the training of researchers, while deans who were trained as scientists gave this goal somewhat lower ratings for science departments in their universities. Field of training was less related to ratings assigned tasks in humanities or social science programs. In all cases, however, the training of researchers was perceived to dominate the physical and biological sciences while the preparation of teachers was most important in the humanities. Training professional practitioners received lower ratings by all subgroups of respondents in each curricular area with most endorsement in the social sciences by deans in public institutions.

Different tasks for different fields of study or disciplines, as well as among programs within disciplines, suggests an additional dimension for consideration in the development of systematic procedures to assess quality in doctoral education.

Table D.1

Ranked Importance of Major Tasks of Ph.D. Programs

in Fifty-four Universities

Curricular Area	Number of deans who ranked each task:* #1	#2	#3	Mean rank
Physical sciences major task is				
to train research scholars	32	11	2	1.33
to train college teachers	9	21	15	2.13
to train professional practitioners	4	13	28	2.53
Biological sciences major task is				
to train research scholars	28	14	3	1.44
to train college teachers	14	24	7	1.84
to train professional practitioners	3	7	35	2.71
Social sciences major task is				
to train research scholars	18	15	12	1.87
to train college teachers	18	18	9	1.80
to train professional practitioners	9	12	24	2.33
Humanities major task is				
to train research scholars	10	25	6	1.90
to train college teachers	29	12	1	1.33
to train professional practitioners	3	4	34	2.76

*Rows do not add to 54 because a few respondents did not complete this part of the questionnaire and some universities do not offer Ph.D.s in all curricular areas.

Table D.2

Major Tasks of Ph.D. Programs, as Ranked by Graduate Deans in 54 Programs

Curricular Area	Programs to train:	Average rank order of importance
Physical sciences	Researchers	1.33
	Teachers	2.13
	Practitioners	2.53
Biological sciences	Researchers	1.44
	Teachers	1.84
	Practitioners	2.71
Social sciences	Researchers	1.87
	Teachers	1.80
	Practitioners	2.33
Humanities	Researchers	1.90
	Teachers	1.33
	Practitioners	2.76

Question: How would you rank the major tasks of your own institution's Ph.D. programs, in order of their importance? Tasks: training research scholars, training college teachers, training professional practitioners.

Appendix E

Universities in the Sample

Northeast

Boston University
Brandeis University
Brown University
University of Maine
Northeastern University
Tufts University
The University of Vermont
Yale University

East

Carnegie-Mellon University
Catholic University of America
Cornell University
University of Delaware
Howard University
Indiana University of Pennsylvania
University of Maryland
New York University
Princeton University
University of Rochester
Rutgers University
SUNY at Buffalo
SUNY at Stony Brook

Midwest

Case Western Reserve University
Indiana State University
University of Iowa
Loyola University
University of Michigan
University of Minnesota
University of Missouri at Rolla
University of North Dakota
University of Notre Dame
Ohio State University
Southern Illinois University
Wayne State University
University of Wisconsin

South

Duke University
Emory University
University of Florida
Georgia Institute of Technology
University of Louisville
Memphis State University
University of North Carolina
at Chapel Hill
Oklahoma State University
Rice University
University of Texas at Austin
Texas Woman's University
Tulane University
Vanderbilt University
University of Virginia

West

Arizona State University
University of California -- Berkeley
Colorado State University
University of Denver
University of Hawaii at Manoa
Idaho State University
University of New Mexico
University of Southern California
Stanford University
University of Utah
University of Washington
University of Wyoming

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